Paper C2-5	***Improvement in Matching Energy Expenditure to Food Intake in a Metabolic Chamber Utilizing Prior Measurements of Free-Living Activity*** *Heli Roy, Pennington Biomedical Research Center, LSU, Baton Rouge, LA*

IMPROVEMENTS IN MATCHING ENERGY EXPENDITURE TO FOOD INTAKE IN A METABOLIC CHAMBER UTILIZING PRIOR MEASUREMENTS OF FREE LIVING ACTIVITY

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ABSTRACT

Introduction: In most feeding studies food intake is matched closely to energy expenditure (EE) to maintain weight. This is done by adjusting intake as needed in the first few days or weeks of eating. In feeding studies involving the use of a metabolic chamber to measure 24-hour EE, there is often an imbalance of EE compared to energy intake during the measurement days due to a reduced level of activity in the confined space of the metabolic chamber. In many studies, EE in the metabolic chamber is reduced 10-20% from normal free-living level resulting in surplus energy balance. Substrate oxidation then adjusts as during overfeeding (preferential carbohydrate oxidation and suppression of fat oxidation) and is not reflective of true substrate oxidation. Therefore, we have devised a method that allows us to closely match individual EE to energy intake during metabolic chamber days to get correct substrate oxidation levels.

Methodology: Eleven females served as experimental subjects, (age [Mean±SE] 25±1.0 yrs, weight 73.8±0.8 kg) and 17 males (age 24.2±1.2 yrs, weight 76.2±2.8 kg) as control subjects. Resting metabolic rate (RMR) was measured for 1 hour in the fasting state after the subjects rested for 30 minutes. The experimental subjects were required to wear a Caltrac activity monitor for three consecutive days including one weekend day. The value was averaged over the three days to get an estimate of average free-living EE. EE in the metabolic chamber was estimated based on individuals' weight and free-living EE. Exercise requirements in the metabolic chamber were then individually determined for each subject by using treadmill speed, body weight, and energy difference to match free-living to metabolic chamber conditions. In contrast, the control subjects simply walked 90 minutes a day on the treadmill during their metabolic chamber stays.

Results and conclusions: Energy balance in the chamber for the control subjects was significantly positive (423±76 kcal) while the experimental subjects were in near-neutral energy balance (79±19 kcal). Using the Caltrac to individually determine exercise requirements resulted in 81% improvement in energy balance for the experimental subjects. This improvement in energy balance should result in accurate substrate oxidation rates during the metabolic chamber measurement days.